## What is claimed is:

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- 1 1. A method of joining plastics comprising:
- a) creating a first surface diffusion zone

  containing therein a first polymerizable material, wherein

  said first surface diffusion zone is adjacent to a first

  surface of a first workpiece; and,
  - b) creating a second surface diffusion zone containing therein a second polymerizable material, wherein said second surface diffusion zone is adjacent to a second surface of a second workpiece, and wherein said first polymerizable material and said second polymerizable material are capable of bonding with each other; and,
  - c) bringing said first surface and said second surface into intimate contact at a bonding surface; and,
  - d) causing said first polymerizable material and said second polymerizable material to react and join across said bonding surface.
- 2. A method of joining plastics as in claim 1 wherein at least one of said first surface or said second surface has at least one microfeature therein.
- 3. A method of joining plastics as in claim 1 wherein at
   least one of said first workpiece or said second workpiece
- 3 is a high-performance engineered plastic.
- 1 4. A method of joining plastics as in claim 3 wherein at
- 2 least one of said first workpiece or said second workpiece

- is selected from the group consisting of polyetherimides,
- 4 polyphenylenes, and polyether-ether-ketones.
- 1 5. A method of joining plastics as in claim 4 wherein
- 2 said first workpiece and said second workpiece are
- 3 polyphenylenes and said first polymerizable material and
- 4 second polymerizable material are mixtures of styrene and
- 5 divinylbenzene.
- 1 6. A method of joining plastics as in claim 5 wherein
- both of said mixtures have a ratio of approximately 9:1 by
- 3 volume of styrene to divinylbenzene.
- 1 7. A method of joining plastics comprising:
- a) creating a first surface diffusion zone
- 3 containing therein a polymerizable material, wherein said
- 4 first surface diffusion zone is adjacent to a first joining
- 5 surface of a first workpiece; and,
- 6 b) providing a second workpiece having a second
- 7 joining surface; and,
- 8 c) bringing said first joining surface and said
- 9 second joining surface into intimate contact at a bonding
- 10 surface; and,
- 11 d) causing said polymerizable material to react and
- 12 join across said bonding surface.
- 1 8. A method of joining plastics as in claim 7 wherein at
- least one of said first joining surface or said second
- joining surface has at least one microfeature therein.

- 9. A method of joining plastics as in claim 7 wherein at
- 2 least one of said first workpiece or said second workpiece
- is a high-performance engineered plastic.
- 1 10. A method of joining plastics as in claim 9 wherein at
- 2 least one of said first workpiece or said second workpiece
- is selected from the group consisting of polyetherimides,
- 4 polyphenylenes, and polyether-ether-ketones.
- 1 11. A method of joining plastics as in claim 10 wherein
- 2 said first workpiece is a polyphenylene, said second
- 3 workpiece is a polyetherimide and said polymerizable
- 4 material is styrene.
- 1 12. A material comprising a plastic workpiece in
- 2 combination with a polymerizable material wherein said
- 3 polymerizable material is located in a surface diffusion
- 4 zone adjacent to a surface of said plastic workpiece.
- 1 13. A material as in claim 12 wherein said surface of said
- 2 plastic workpiece has at least one microfeature therein.
- 1 14. A material as in claim 12 wherein said plastic
- workpiece is a high-performance engineered plastic.
- 1 15. A material as in claim 14 wherein said plastic
- workpiece is selected from the group consisting of
- 3 polyetherimides, polyphenylenes, and
- 4 polyether-ether-ketones.

- 1 16. A material as in claim 15 wherein said workpiece is a
- 2 polyphenylene and said polymerizable material is selected
- 3 from the group consisting of styrene and mixtures of
- 4 styrene and divinylbenzene.
- 1 17. A microfluidic device comprising at least one
- 2 high-performance engineered plastic component joined by the
- 3 method of claim 1.
- 1 18. A microfluidic device as in claim 17 wherein at least
- one of said high-performance engineered plastic components
- 3 is selected from the group consisting of polyetherimides,
- 4 polyphenylenes, and polyether-ether-ketones.
- 1 19. A microfluidic device as in claim 18 wherein at least
- one of said high-performance engineered plastic component
- 3 is a polyphenylene.
- 1 20. A microfluidic device comprising at least one
- 2 high-performance engineered plastic component joined by the
- 3 method of claim 7.
- 1 21. A microfluidic device as in claim 20 wherein at least
- one of said high-performance engineered plastic components
- is selected from the group consisting of polyetherimides,
- 4 polyphenylenes, and polyether-ether-ketones.